# SUPPLEMENT.


# The Mining Journal,

## RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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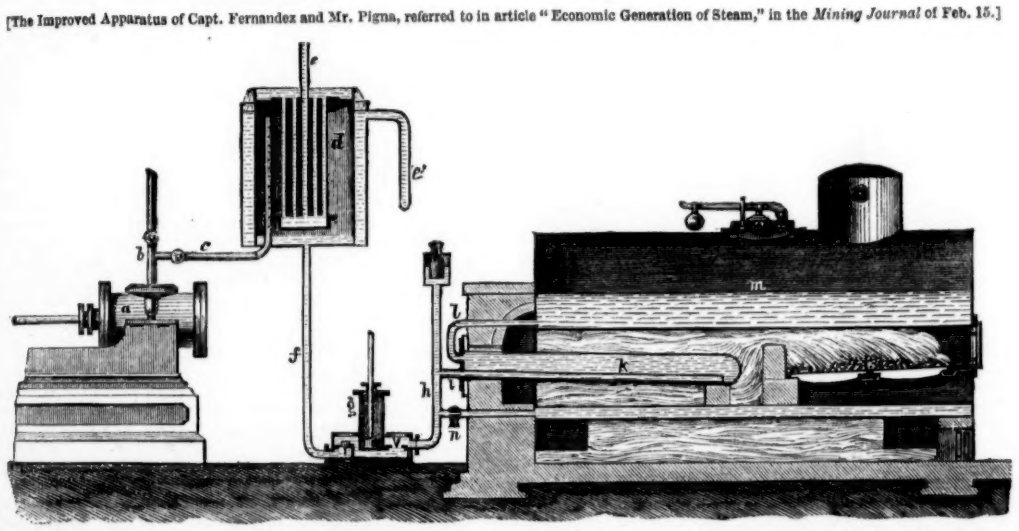
## STEAM REGENERATORS.

[The Improved Apparatus of Capt. Fernandez and Mr. Pigna, referred to in article "Economic Generation of Steam," in the *Mining Journal* of Feb. 15.]




the drawing annexed *a* is the cylinder of a horizontal high-pressure en- *b*, a pipe for conveying the steam, which ordinarliy escapes after acting e piston, through the pipe *c*, into the receiver or surface condenser, *d*, portion of the pipe (*c*) contained within the chamber or vessel (*d*) is rated with numerous apertures or openings, to admit of the steam sepa- g and passing there through, coming in contact with the tubes or contained therein, whereby it is condensed (forming almost a per- cuum, and increasing the effective force of the steam on the piston). alls into the lower part of the receiver. This vessel or receiver is t a low temperature by means of cold water fed from the pipe *e*, passing therethrough, and circulating up the tubes into the upper receptacle, where it flows into the exterior casing, and from thence through the exit pipe, *e*. By means of the pump, *g*, the condensed steam is alternately drawn and forced from the vessel, *d*, through the pipes, *f h* and *i*, into the regenerator, *k*, placed in the flue, where it is subjected to the heat arising from the products of combustion, and thence by a second pipe, *li* into the boiler, *m*, which it reaches completely regenerated, and ready to act again on the piston with all its original force. A cock, *n*, is provided for the purpose of shutting the feed off from the lower portion of the boiler when necessary, and may be used as a sluice-cock.

## Original Correspondence.

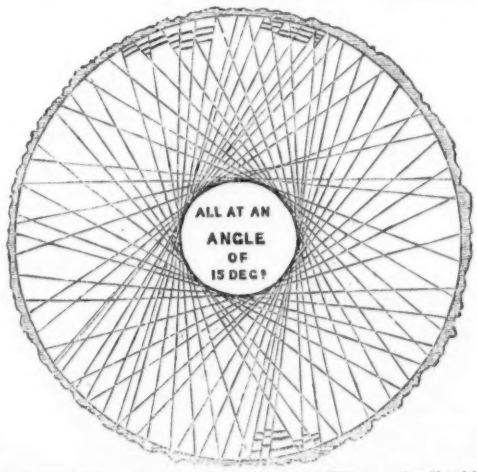
### OLOGICAL FORMATION OF THE EARTH—No. XVIII.

,—I have already illustrated in the Journal the section of coal beds rham, as taken by Professor Ansted, and also the position the sur- would assume were those beds replaced to what may be fairly pre- their original positions, and in the Journal of Feb. 15 the sections l beds as now found, and the position of three sea levels, which, on replaced to their former levels, will be found to correspond with the ds, the separate sea levels then assuming the same line. These changes of levels erned by the same law as all other moves. I now submit a diagram, represent- section of the globe in an east and west direction, on which the north and south nly are shown, dipping at an angle of 10°. The principals of the Geological Society tablished as a law that 22½° is about the average dip of north and south lodes earth. If such is the case, it leaves about one-third of its diameter a void, or without ersection of north and south lodes. It is of little importance at what angle of dip odes may be fixed, as, by my theory, it can only alter the extreme points of inter- in the earth to a greater or lesser radius from its centre, where a certain peri- is defined that makes north and south lodes of a uniform length. The lodes receive upport from the great interior laboratory, no matter at what angle they dip, be it 40, or even 60 degrees. Practicals are well aware that lodes do dip through every nd are found continuing so as deep as man has followed them; we have, there- o ground for supposing they alter as they extend beyond our reach, and, in sup- this, my theory of the law of lodes is materially strengthened, and the views I nd borne out, by the fact that on the diagram which I submit can be found cor- ding sections to those of Professor Ansted or any other person, when such has been wn from nature. Then what more convincing proof can be adduced? I have id by Professors, and even would-be Practicals, that lodes die out in depth. What lodes, so supposed? Are they other than imperfect east and west ones running nt, and in nearly every instance are not the opposite points to be found? I never a well-defined east and west lode dying out at such depths as man has been able w them, though there cannot be a doubt all such lodes do die out at depths where rth and south lodes become more contracted, and the intersections more numerous. rticular reason, I believe, of their not extending in depth is their being transverse axis of the earth. In east and west lodes I have not unfrequently found the ore ut; but the lode itself has always continued well defined. North and south t will be observed, pass across each other at a distance from the centre of the forming a kind of protection to the portion it encloses. Many who have travelled uit of geological studies, and written extensively on the subject, cannot distin- between horn-spar courses and a lode when presenting itself in the mountain herens Practicals can define them at a glance. These are only lodes formed for ployment of the gold-seeker. East and west lodes cannot be other than V-pieces n the north and south lodes; and I contend that man never did nor never will te the bottom of a massive north and south lode. He may find such lodes shifted et, but nothing more; and I would be glad if some of the all-wise professors of tonic theory would explain how mountains overlaying coal beds passed up through ls and the north and south faults without destroying them. I think I have suf- y explained this subject for Professors to discover that the growth of one piece ay of another has moved the coal beds so far from each other. Professor Ansted's must convince them that these changes have been a work of time, and not a eruption, the greater portion of the moves taking place prior to the deluge pass- r the earth. A learned lecturer, of Bristol, and two Government Inspectors stated the period at which the great anticlinal axis of the Mendip was formed. I sup- ey arrived at their conclusions from noticing a slight move in the strata since the and, knowing the period at which that took place, they were enabled, by a simple proportion, to name a period anterior to the deluge so accurately that they could on oath when the first movement commenced. These talented men, no doubt, en allowed a minute inspection of the vaunted collection of shells in the London School, by which, it is said, those who study them can define almost to a year ach layer of rock was formed.

y not be out of place to notice here that, about twenty-six years since, a very l stalactite cave was discovered at Cheddar. The finder (being an intelligent ok the best possible means of preserving it, not allowing the stalactites (some of were from 6 to 10 feet long) to be broken off. At one point a drop had caused ension of the uppermost stalactite downward and the lower one upward, until they proached each other so close that there was not sufficient distance between for the fall, consequently it trickled off on to the one below. This circumstance led the to imagine that, by watching carefully this peculiar phenomenon, he would be to measure time. Shortly after, the Bishop (I think) of Llandaff visited the whom the owner made known his intention. The Bishop replied that it would sary for him to live a thousand years to accomplish his object. Not long since opportunity of seeing both the stalactites and the owner, when he freely ex- himself on the wisdom of the Bishop's remark, as he could not discover the least ible change during the twenty-six years. This fact should be recorded, and I mention it here as a guide to future generations, and would add that much credit is due to the Bishop, who has proved himself to be a useful, thinking man.

This will be followed by other sections and my observations thereon.

NICHOLAS ENNOR.




[The engraver having made the section too small, the lines are not well put in; but anyone may see the plan on a large scale by calling at the *Mining Journal* office.]

## ENGLAND'S POSITION.

### THE MINERS, MINING SCHOOLS, AND CHEMISTRY.

BY NICHOLAS ENNOR.

SIR,—Before entering on these subjects I have to call to notice the proud position Old England stands in; she boasts her 30 millions sterling produced from mineral resources. Is it not this that sets her wheels in motion, and enables her to pay somewhere about 70 millions taxation? Take from her these mineral resources, and what is her position? I ask, who developed these resources? Was it not the self-taught Practical miners? Then I ask, who ever aided them? Have either of the fortunate landowners, receiving their tens of thousands a year as dues, ever endowed a single school to educate them? Did Government ever found a school for them, or ever select a scientific chemist and send him into the mining district, to carefully analise whatever strange metallic substance the Practical might find, free of expense? No, never; it was all left for the hard-working penny-less miner to develope. See how nobly he has done his work; he planted an extraordinary tree that will bear an annual taxation of 70 millions. Still, I contend that there is nothing in all creation so much a mystery to man as Nature's laws, the workings of the earth, and the deposit of mineral substances. The mines are deepening and becoming expensive, and the Practical still stands in need of a helping hand.

It has of late become self-evident that Government, the educated professor, and the chemist, are in duty bound to come forward and put their shoulders manfully to the wheel, and aid the self-taught miner to maintain England in her present position, without which they will some day find their legs carried from under them by an unexpected shot. Of late the education rage set in—for what? to moralise the street vagrant, a move in the right direction. National schools were then established, all to be paid from that wonderful prolific tree of taxation. Notwithstanding this, Government appeared to be hoodwinked; nothing was moved or attempted by way of aiding or instructing the practical miner; they never proposed to even award him a medal, equal to those given to the common soldier who happened to be at the Crimea, as a remuneration for that prolific tree he planted on the soil of Great Britain.

The Government, the lordling, and the nation at large, appear to remain blind to the real sources which support their very existence; they even throw everything in the miners' way, by extracting enormous dues, and demanding large sums as bonus. See the lord of Devon Consols; look at the demand of the lord of Cuddra Mine for an acre of barren land that will barely maintain a Scotch pine; then look at the Duchy holder, who should be the miners' protective guide. See the time required to get a lease from the hands of those in office; should the applicant happen to be a practical man, that has not got his 5000*l.* or 10,000*l.* at command, his application is dismissed; should he be fortunate enough to get a lease after two or three years' correspondence, he thinks himself lucky. Then, he has 20*l.*, or even 50*l.*, to pay his own lawyer for writing for him, and most likely from 50*l.* to 100*l.* for his lease, and not unlikely 100*l.* or 200*l.* to some one on good terms with an official individual, by way of giving him (the applicant) a character, and interceding for him. All this done, and the lease obtained, the applicant finds the party that had volunteered to join him have disposed of their cash in some other way, or they are gone to Australia; he is at once in a fix, and can find no one to join him; he having spent all his spare cash, he has no alternative but to go to work as a daily labourer, or to emigrate to the United States to develope their mineral resources. Who are developing the mineral resources of the United States at this time but the intelligent, the noble, and the brave British miners, that planted in England that extraordinary tree. Should the applicant, after getting his lease, succeed in forming a company, and perchance spend on it, as is often the case, some 30,000*l.* or 50,000*l.*, and at the eleventh hour discover a valuable deposit of ore, how cruel would be the act of even the Prince of Wales to turn round and say—"Your term is nearly up, I will not let again unless you give me a bonus of 5000*l.*, 10,000*l.*, or 20,000*l.* pounds." I recollect my father was a shareholder in the Phœnix (then known as Clinscombe) Mine fifty years since, and lost hundreds in it; after that it was worked by a new company, who also lost all their money, the receiver for the Duchy never offered to refund a single shilling of the loss of either of these companies; the third company spent a good deal of money before they had a paying mine; and I contend it was unfair to demand a bonus, they might have bound them to spend a named sum in exploring the western ground.

The Duchy should be carried out under a code of laws, as a model for mine grants, with rules, showing the time for correspondence, and for drawing the lease, costs of the same not exceeding 10*l.*, no middle attorney being allowed, the grantor taking care to name the amount that should be spent in surface buildings; in fact, the Duchy should be worked under a good framed set of laws, holding no shareholder responsible but for the amount of the shares he was booked for. They should found a model Limited Liability Act, free of costs, the Duchy officers having power to investigate all accounts, if required, by giving a month's notice to the shareholders. They *now* set bad examples. If a law were laid down by the Duchy officers, framed so as to be beneficial to the lord and adventurer, all lords would, to a certain extent, follow this example, and shareholders would embark in mining without a risk of being fleeced of their capital. All must now be aware that British mines are becoming deep and expensive, and will have to be carried out systematically, or abandoned. I contend it is time to look ahead, and see that England's tree of life is not in danger.

Notwithstanding the utility of the miner, nothing has been done by way of aiding or instructing him, until Mother Earth became wrathful at their intrusion, and commenced burning and destroying them by hundreds. This aroused those that reaped their extraordinary and lordly harvest. These, fearing they should not be able to keep up their lordly destiny from mining incomes, and that they would ultimately have the miners' widows and orphans to maintain, saw it was time to make a move, and endeavour to put a stop to that grim messenger, Death, so visible in every coal mine. What was their first cry?—*Educate the miners.* Then, what was their first move to carry it out?—Not as might be expected, a tax on all the dues and profits derived from every mine, but by a combination among themselves to carry a bill through Parliament for the nation to provide schools and teachers to instruct the miners, and train them to use such arms as would enable them to battle with that invisible enemy, Death. Not a shilling do they pay more than the nation at large, notwithstanding they are receiving such princely incomes, which enable them to build their lordly mansions, all arising from land apparently not worth owning a hundred years ago. These lords sided together, framed their bill, and carried it through the House, compelling the nation at large to establish these schools. It has now become the law, and it is no use grumbling—it is decided to be paid from the public purse. Schools are established for training Inspectors for coal mines, but the metallic miners, who planted the productive tree that yields the enormous amount of taxation, notwithstanding they are dying off by thousands at the average age, as Mr. Hunt says, of 30 years, still they are left to fight their own battle, and to establish a school by private subscription. A casual lord may have aided them with a few pounds, but it is not general. Had the Prince of Wales persisted in making the Phœnix mine owners pay 5000*l.* or 10,000*l.*, and the lord of Cuddra his 500*l.*, that they are not honourably entitled to, they having otherwise an ample share as dues for ores raised from such lands, and hand it over to aid a greatly-wanted mining school, it would appear much more in conformity with the age we live in. I may remind them that Education has already opened the eyes of the most intelligent of the labouring public, and they now discover they are the main support of the nation. The princes and the lordlings are bound to conform to the age we live in; their standard value is known by public test, which in this and in the ensuing age must seal the destiny of all domineering aspirants. The metallic miners of England, that so long since planted England's invaluable tree, are not short-sighted men, they know their position, they only want schooling, and to gain that they have only to say we must have a school to teach us the art of underground mining, surface dressing, with machinery in all its branches, dialling, assaying, smelting, and, in fact, chemistry, mineralogy, and hydraulics. I ask if this is to be doled out to them from their own weekly earnings, which barely provide bread for their families? I say no; it never can be expected that so noble a race as the British mining men (whom we all know raised England to its meridian of glory) shall be called on to found and maintain their own school. If those who take the lead of the nation will not at once found and maintain a good and proper school in the mining districts, let the miners petition in a mass, and what narrow-minded lords can withstand them? If the Government will not open their eyes to such a reasonable request, let all the young and able-bodied miners that need it subscribe to a fund for emigration, and do so to a man. All know that the arms of all the nations in the whole world are wide open to receive the invaluable English miner: 20,000 of our best metallic miners have already emigrated, and if a second 20,000 go their boys will follow them, when the old and infirm will not be competent to carry out our *old* and *deep* mines, so as to compete with the result of the young and able miners' returns from unexplored foreign climes.

I next notice the late Fishery Act. Did the legislators of England consider their positions for a moment? I think not; or they never would have sanctioned such a ruinous Act. From the time of creation water, and all the filth of man through the known world, was bound to run into the rivers, and from thence into the sea. Turning to England's position, a country blessed with such mineral resources as to stimulate the arts of manufacturing to such an extent as to place it in pre-eminence to all the world, to *carry this out first the mines* have to be *drained* of water, the ores dug out, washed, and smelted; then handed over to the manufacturer, who has to use ingredients suitable to his trade, and to wash and make the same marketable; where is his filth to go but into the rivers, and be carried into the sea, where the all-wise Creator established means for its purification, when it is again returned to us to be again used in a pure state? this was its round from the commencement, and will ever continue. I admit a few fish were formed to inhabit portions of these streams, but where certain substances were placed by the Creator that would become useful to man fish were omitted, or could not exist. It is a well-known fact that these mineral resources, of their own working accord, have exterminated fish that once existed in their waters. It cannot for a moment be contended that England should take pre-eminence of the world in mineral resources and manufacturing goods, and retain her fish. They cannot work in the same element of fluids, one must be sacrificed to retain the other; then which shall it be? The tree bearing over 70 millions taxation, or the inland fish, that I am not aware pays one shilling taxation? I am not referring to sea fishing, but to inland fishing. I next ask how this fishing benefits the nation? I may be told that it gives employment to a great number of the lower classes. I happen to know as much about this class of men as most persons, and ask if they are not at times driven to extreme want from unfavourable weather and unforseen events, and if it does not cause them to become poachers? Then I ask if every poacher does not ultimately become a thief? I contend that the fishery and the every poacher does not ultimately become a thief? I contend that the fishery and the every poacher does not ultimately become a thief? I contend that the fishery and the game law ever was, and ever will be, England's nursery for thieves; not one in a thousand of them will ever do a day's work. The inland fisherman nor the fowler never fairly earn 6*d.* per day clear through the year, but they drink to excess. Then comes the main bone of contention. Gentlemen must have their hobbies, a pleasure-ground well stocked with game, and their ponds with fish. Let if be so; but let them make their own artificial ponds. The rivers ever were, and still are, every man's public highway, as much so as the street we walk in or the atmosphere we breathe. No law should prevent man from using water to carry off his filth, or by the way of carrying out a beneficial trade. The public are ever ready in discriminating if any man is wilfully and maliciously doing an injury to his neighbour, and not benefiting the public or himself.

When we look around and see old-established mines, where the kings of England, 500 years ago, sent their Lords Chief-Justice on the spot, to establish the law and right of miners to turn their filth into the main stream, for the benefit of working mines, it does appear a strange proceeding with the legislators of the nineteenth century, in the midst of their boasting of England's mineral wealth, amounting to 30,000,000 sterling, and its manufactures come to such perfection as to enable England to pay a Government taxation of 70,000,000*l.*, independent of poor and highway-rates, county and police-rates, church-rates and tithes, a point never before attained by any nation in the world; surely our legislators will discover, before they drive the invaluable miner from this land, that this state of things cannot be maintained, and they are bound ultimately to repeal all such

abominable Acts, retaining only such portions as are really beneficial to the nation. Let the miner and manufacturer measure their strength, and these oppressive laws must be repealed; in fact, the miners may get them repealed by their own strength, if they are only true to their calling. We want no extremes; we have only to adopt the Cornish motto, "One and All," and all the miners in the kingdom will join. We are entitled to equity to fair and honest able mining laws, with the right of all original water-ways for carrying off all surplus filth that arises from mines, factories, and, in fact, from any source whatever. There is a wide difference between dirtying the water in a stream and sending in such quantities of sand as will choke up a river and destroy the adjoining land: parties should keep catch-pits for such dirt; none would object to it. We have only to say, at a coming election—"Mark all fisherymen, and stick to your petition; you are sure to win." The nation is bound to aid you with mining schools and fair mining laws.

In conclusion, I ask the metallic miners to petition *en masse* for good paid schools, and funds to aid the maimed and fatherless; they are entitled to it, and are bound to have it. Let some one be selected to battle for them in the House, as Trelawney has against church-rates. It may be said Government has already established mine schools. In my next I will endeavour to analyse them. Let the metallic miners petition.

## THE PRINCIPLES OF GEOLOGY.

In continuing his evening lectures at University College, Prof. MORRIS, F.G.S., remarked that the rocks composing the crust of the earth may be divided into igneous, metamorphic, aqueous, and sub-aerial, according to their origin; the term rock being applied to any considerable and extended mass of mineral substance, whether it be hard or soft, loose or compacted together. The igneous rocks are crystalline aggregates, in which there are no remains but those of inorganic matter; they occur sometimes as the nuclei of mountain chains, and often dislocate the beds lying against them, being interstratified or injected among them. They consist of two or more mineral substances, sometimes joined by cement, sometimes not. Many of the minerals composing them contain but little water in their composition, and hence are called anhydrous: granite and the allied rocks, and porphyry, are examples—the former is not cemented, but a crystalline aggregate, composed of quartz, felspar, and mica. The latter (porphyry) is cemented, and contains crystals of felspar disseminated in a felspathic base. These rocks belong to the plutonic series, and are older than many other igneous rocks; they are well shown in Cornwall, Devon, Leicestershire, Anglesey, Cumberland, Scotland, and Ireland. The porphyries rarely occur as mountain masses, but are thrust in as veins among the granitic and sedimentary rocks, as the elvans of Cornwall. Next in age come the trappean rocks, so called from their stair-like appearance, which is owing to their peculiar structure and irregular weathering, as greenstone and basalt. There are many varieties, but they are not so crystallised as granite. Greenstone is composed of felspar and hornblende; and basalt, of felspar and augite. They are of later date than the granitic rocks, and occur as dykes or veins in sedimentary rocks, generally newer than those pierced by plutonic rocks; they often occur in the coal measures, as at Powk Hill, near Walsall, Rowley, and the Titterstone Clee Hills. Near Newcastle one of the dykes has turned the adjacent coal into coke, and caused it to assume a columnar arrangement. Fingal's Cave and the Giant's Causeway are examples of basaltic rocks. Then come the volcanic rocks, produced by igneous matter thrown out of volcanoes, as at present; such as trachyte, a felsphatic rock; obsidian, a dark glassy substance; pumice, a frothy felsphatic rock; and lava—they are more cellular than the older igneous rocks, and often have cavities filled with zeolites, which are hydrous minerals, composed of silica, alumina, lime, and some alkali.

A second great class of rocks is the metamorphic, generally found on the sides of mountains and in proximity to igneous rocks; the metamorphic rocks are presumed to have been changed from their original form. They are, probably, sedimentary rocks altered by heat and aqueous vapour, and show signs of irregular stratification or foliation; we have examples in gneiss, which is stratified granite, mica-schist, talc-schist, quartz rock, and some crystalline limestones used for sculpture. The metamorphic rocks frequently contain accessory minerals, as garnet, zircon, tourmaline, and are the chief depositaries of metallic ores, as copper, iron, lead, bismuth, &c. A third great class is that of the sedimentary, stratified, or water-formed rocks; these were formed by the same natural agencies as are at present in operation, and contain remains of animal life, cotemporary with the deposition of the various beds—to the class of mechanical-formed rocks belong, for example, the clays, shales, sandstones, and pebble beds; to the chemical-formed belong limestones in part, rock salt, and gypsum; and to the organic division belong likewise many limestones, inasmuch as they are composed of organic exuviæ, and also the different varieties of coal or the carbonaceous rocks. The sub-aerial or colian rocks, as they are sometimes called, include those deposits formed on the surface, as blownsand, dunes, volcanic-ash, some tufas, &c. Thus we have according to their origin:—

| | | | |
|---|---|---|---|
| IGNEOUS | Plutonic | | Granite, syenite, porphyry, &c. |
| | Trappean | | Greenstone, dolerite, basalt, &c. |
| | Volcanic | | Trachyte, lava, pumice, &c. |
| METAMORPHIC | Foliated | | Gneiss, mica-schist, talc-schist. |
| | Slaty | | Clay-slate. |
| | Calcareous | | Limestone, dolomite. |
| AQUEOUS: | Mechanical-Formed | Argillaceous | Clays, shales, &c. |
| | | Arenaceous | Sandstones, conglomerates. |
| | Chemical-Formed | Calcareous | Limestone, rock-salt, & gypsum. |
| | Organic-Formed | Calcareous | Shell and coral limestone. |
| | | Carbonaceous | Peat, coal, anthracite. |
| SUB-AERIAL | | | Sand, dunes, volcanic ash. |

The importance of the student becoming acquainted with the common rocks which enter into the structure of the earth's crust was the subject to which attention was first drawn in the third lecture, Prof. Morris remarking that although there were 500 or 600 different species of minerals, but few were important. After recapitulating the facts he had laid before them in the previous lectures, he said that they would next consider the principal minerals which occur as rocks, and a knowledge of 25 or 30 species would include all that were essentially necessary for this purpose. He would class them into three groups—Firstly, those which formed an essential component part of rocks, whether such rocks were simple or compound; secondly, those which occasionally occurred; and, thirdly, those filling veins or fissures, or occurring in beds—this last class including the ores of metals. If we take a piece of granite we find it to consist of three minerals—quartz, felspar, and mica, and we should especially notice the first of these, as it is of very common occurrence. In all rocks quartz, or some other form of silica, clay or alumina, lime, oxide of iron, and water, are generally found. To continue the observation of granite, quartz is sometimes the principal component, and this same, or a similar silica, constitutes probably one-half of the entire minerals of the globe; rock crystal is pure silica, and in a highly crystallised condition, and amongst the many other compounds of silica are chalcedony, opal, agate, flint, cornelian, jasper, and other so-called siliceous minerals. In the stratified rocks, again, silica forms the base of conglomerate, sandstones, and of all the so-called siliceous rocks. Felspar, the next mineral to be referred to, is that which gives the red or grey colour to the granite, the colour of the granite depending upon the colour of the felspar, and thus we have the grey granite of Devonshire and the red granite of Aberdeen, and elsewhere. Felspar is composed of silica, alumina, and potash—being, in fact, a tersilicate of alumina combined with a silicate of potash and a little iron; felspar is not so hard as quartz. The felspar which enters into the composition of granite is usually the potash felspar, or orthoclase, though sometimes the potash is replaced by soda, and the felspar in the granite is then in the form of soda-felspar, or albite. Labradorite, again, is another form of felspar, which also frequently enters into the composition of igneous rocks; thus we have the different forms of felspar, as orthoclase, oligoclase, albite, labrodorite, anorthite, the latter having been found in the Carlingford syenite, by Prof. Haughton. Mica, the third constituent of granite, is readily recognised; it is foliated, and usually of a silver-white colour, though it is sometimes dark: it occurs in thin plates, or layers, and is readily scratched with a knife. It is the softest constituent of granite, and is composed of silica, alumina, magnesia, and oxide of iron, so that, even looking at so common a subject as a piece of granite, we see the very important part which silica plays. The ordinary mica is potash-mica, but there are also the lithia and magnesia-micas, and lepidomelane, which occurs in the Leinster granite. Hornblende is a dark, blackish mineral, crystallising in the same form as felspar; it is composed of silex, lime, magnesia, and iron, and occurs, for example, in syenite (which is a variety of granite), in which the hornblende replaces generally the mica of granite. It also enters into the composition of the more recent igneous rocks; greenstone, for example, being a compound of hornblende and felspar. In the slate, or schist, formations it occurs as hornblende schist. An allied mineral, abundant in the igneous rocks, is augite, or pyroxene, as it is termed by the German and French mineralogists; it is very similar to hornblende, and is composed of silex, lime, magnesia, and oxide of iron. Augite belongs to the same crystalline system as hornblende, but the prism is somewhat different, and does not present the same resinous lustre; it is found in the basalts—the Giant's Causeway, for instance, is augite, with probably labradorite, and it is also found in the products of volcanoes, for lava is augite combined with felspar. Eudialyte enters as a component part of some rocks, as in Greenland, where it is associated with felspar, arfwedsonite, and sodalite. Chlorite is a greenish mineral, much resembling mica; it is softer than mica, and, like mica, is composed of silica, alumina, a tolerably large proportion of magnesia, and iron. Chlorite forms a constituent of some of the earliest metamorphic rocks, as chlorite-schist, but it is a widely-distributed mineral, occurring in many other rocks, and is associated with talc, another magnesian mineral, in potstone. These few minerals are the principal which enter into the composition of the igneous rocks. We find felspar in various forms; for example, pumice is a scoriaceous felspar, trachyte is a granulated felspar, examples of which we find on the Rhine and in Central France; trachytic eruptions being met with in the Siebengebirge, Eifel, Auvergne, the Westerwald, and Hungary.

The next class for consideration is that containing those mineral substances which occur as simple rocks. Chloride of sodium, or rock salt, occurs in considerable beds, as in the lower secondary formations in this country, as in the new red sandstone of Cheshire, and on the Continent it is found in the same and other formations, in Germany, the Tyrol, Calabria, Pyrennees, Poland, and the Kirghis Steppes of Russia, whence it is evident that it has been formed at different times. Gypsum, which is another mineral of this class, is a hydrous sulphate of lime; it is composed of sulphuric acid and lime, combined with water. Selenite is prismatic gypsum, whilst massive gypsum is the alabaster of commerce, or sulphate of lime. It is something like limestone, but is softer than granular limestone, and is readily distinguished by testing it with hydrochloric acid—there will be effervescence with the limestones, but not with the gypsum rocks. Last of this class of minerals is carbonate of lime; it enters into the combination of many minerals—the soft variety is well known to us as chalk; when compact it becomes valuable as building stone, and in a crystallised state we call it marble. Carbonate of lime crystallises in the same system as quartz, either as a six-sided prism or as a rhombohedron, but it is readily distinguished from quartz, because it is softer; it does not scratch glass, which quartz does; and it effervesces with hydrochloric acid, which quartz does not. Two other substances may also be named: dolomite is a combination of carbonate of lime with carbonate of magnesia; it is, in fact, a magnesian limestone fairly crystallised, and is in this country chiefly found in the permian rocks. True dolomite is highly granular or crystalline; this is the best durable stone for buildings, as the earthy varieties undergo more rapid decomposition, and are more easily attacked by the atmosphere, especially by that of towns. It occurs in thick beds in the permian rocks and the mountain limestone, though in other parts of the world the magnesian limestones are found in different parts of the geological series. Alumina is the basis of the clays mixed with silica, carbonate of lime, iron, and other substances; they are compact and friable, and of various colours. The chief varieties are kaolin, or porcelain clay, pipe-clay, potter's-clay, slate-clay, black chalk, bituminous shale, loam, &c. Sulphur, the other substance, does not form very extensive beds, but occurs in large layers, and may be readily known by its taking fire, and burning with a peculiar blue flame; it is found in various localities. Lastly, coal may be considered as a rock; it does not occur in a single bed, but in many beds, both in this country and in Belgium, where the seams beneath each other are very numerous. There are many varieties of coal, which are generally known by distinctive names, as cherry, caking, splint or cannel, of the bituminous series; and anthracite, or non-bituminous, coal. In this country it is sometimes found, in thick beds or seams, the best example of which is the 10-yard seam in Staffordshire. In the United States, again, we find anthracitic matter of even greater thickness than this; the celebrated Mons Chunk bed being 40 or 50 feet thick, and sometimes even more.

The Professor next passed to the accessory minerals, or those which do not form an essential constituent of rocks, remarking that at present he would only briefly allude to them, though in a future lecture he might revert to the subject. Garnet, diallage, olivine, chrysolite, tourmaline, fluor-spar, magnetic iron, iron pyrites, zircon, topaz, and beryl will come under this head, and, lastly, a group of minerals, considered to be characteristic of the rocks in which they occur, called zeolites. These zeolites are found filling the cavities of the more recent basalts and lava; they are composed of silica, combined with alumina, soda, lime, and water. Zeolites, as a group of minerals, occupy a position somewhat allied to a group in the older plutonic rocks; they are, however, readily distinguished from each other—those in the older rocks being anhydrous, whilst the zeolites, or those of the newer rocks, are hydrous; consequently, they may be regarded as characteristic of the newer rocks, though they are sometimes found in metallic veins. With these observations he would conclude his lecture, and trusted the students would acquire some knowledge of the principal rocks which were commonly met with. He might tell them, however, that garnet is frequently found in the metamorphic rocks, as in mica-slate or mica-schist; whilst zircon, beryl, and topaz occur in the granitic rocks; topaz is often found in Ireland, zircon in Norway, and beryl not unfrequently in the granites of Ireland, Brittany, and Australia, Olivine occurs in cavities of basaltic rocks in the Rhineland; and, lastly, fluor-spar is found in the veins or fissures of metallic lodes, as those of lead in the limestones of Derbyshire and Cumberland, and occasionally in the tin lodes of Cornwall.

HEAT-CONDUCTING POWERS OF AMALGAMS.—At the recent meeting of the Manchester Literary and Philosophical Society an interesting paper "On the Conductibility of Heat by Amalgams" was read by Dr. Crace-Calvert and Mr. R. Johnson. It will be recollected that after a series of careful experiments, the details of which were communicated to the Royal Society, and published in the *Mining Journal*, they found that the conducting power of mercury, when the heat passed horizontally through it, was 21·60, silver being 31·9, or taking the conducting power of silver, the best conductor, as 1000, that of mercury was 677. When, however, the heat was applied at the top of a vertical column, so as to avoid any motion of the solid molecules of the mercury, they found that mercury was the worst conductor of all known metals, its power to conduct heat being represented by 54, silver being 1000. In the paper read at Manchester the authors pointed out the circumstance that, owing probably to this peculiar property of mercury, it was found that when only 2 per cent. of silver, tin, copper, gold, bismuth, lead, cadmium, or zinc was added to mercury, and heat applied at one end of a horizontal column, the heat-conducting power of the amalgam could not be calculated theoretically by using either 677 or 54 as the number representing mercury. Nor is this all, for the table of results actually found showed that in these amalgams the greater or less conducting power of the metal amalgamated with the mercury had no influence in modifying the conductibility of the amalgam itself—the amalgam of bismuth (the worst conducting metal) conducts heat eight times better than that of silver (the best conductor). They were induced to believe at the beginning of these researches that the cause which impeded the conduction of heat in so marked a manner in some of these amalgams was the presence of small crystals of amalgam floating in excess of mercury, as they had observed that whilst the crystallised amalgams of silver and tin conducted heat badly, that of zinc, which was pertectly fluid and free from crystals, conducted heat very freely. As they pursued their researches they found these views to be incorrect, for the amalgam of bismuth, a very crystalline one, conducted heat with great facility.

WHAT IS GOOD IRON, AND HOW IS IT TO BE GOT? is a question of such general interest that the pamphlet just issued (through Mr. J. Murray, of Albemarle-street), in which the subject is discussed at great length, will, no doubt, be extensively read. Unfortunately, the writer does not give his name, or some inference might have been drawn as to the precise object of his writing; as it is, we can only discover that he considers that too great competition has caused an inferior quality of iron to be used for purposes to which the best quality alone is applicable, and that in consequence of this it is difficult to obtain first quality iron, even when the best price is paid: the author endeavours to explain why good iron can neither be bought nor sold. The discovery of smelting iron by means of pit coal gave England the command of the markets of the world, but has lowered the quality of the iron. In our own days the introduction of the hot-blast has brought about a second revolution in the manufacture, hardly less important than the first in its results, but, unfortunately, qualified with a larger alloy of evil—it has enabled the iron to be extracted from every substance containing it, instead of limiting the maker to the use of the best ores only. Referring to the fluctuations in the prices of iron, it is very truly remarked that "Through all these fluctuations, as might be anticipated, there is to be traced a steady decline of price. In 1806, according to tables lately published at Liverpool, 'merchant bars' (finished iron) made from cold-blast pig-iron (for none other was then known) were quoted at 17*l.* 10*s.* per ton. In 1861 the best make of Staffordshire had sunk to 7*l.* 10*s.*, and Welsh bars might have been bought for even less than 5*l.* 15*s.*" It is but justice to the author to state that he simply condemns the substitution of inferior iron for good, but does not in any way object to the use of iron originally of an inferior character, provided the impurities have been removed by the adoption of any of those ingenious inventions which from time to time are introduced. The author advocates the use of rails of tough iron of good quality, with "steely" iron for the wearing part; he deprecates the use of cinder iron, and explains the mode of ascertaining that iron is neither red-short nor cold-short. With regard to Government affairs, he recommends that the Government should purchase puddled-bars, and perform all subsequent operations themselves. Upon the whole, the pamphlet is worthy of perusal, and more especially that portion of it in which a sketch of the iron trade is given; it contains much which should be generally known, and which will prove valuable to all classes of the community using iron or steel.

## ON THE IMPURITIES OF COMMERCIAL ZINC.

A series of carefully-conducted experiments for ascertaining the nature and extent of the impurities existing in the ordinary qualities of commercial zinc have been undertaken by Profs. Charles Eliot and Frank Storer of Cambridge, U.S., and the results have been embodied in an elaborate paper presented to the American Academy of Arts and Sciences. Although the widely-spread error that carbon is the chief admixture in crude zinc, as it is in cast-iron, has been often corrected, still the information on the whole subject lacks precision and certainty, the statement of the best authorities being generally inaccurate, and sometimes contradictory. The zincs experimented upon comprised samples of Silesian, Vieille Montagne, and New Jersey (U.S.), all obtained from Mr. John Revere, of the Revere Copper Works, Boston; of Pennsylvanian, direct from the Pennsylvania and Lehigh Zinc Works, Bethlehem; of Vieille Montagne zinc, such as used at the United States Mint; of a zinc labelled "zinc pur," and purchased of Rousseau frères, in Paris; of a sheet zinc, of an unknown origin, obtained in Berlin; and of four samples of English zinc, made at Mines at the Mines Royal Company's Works, Neath; at Messrs. Dillwyn and Co.'s, Swansea; and at Messrs. Vivian's, Swansea—these latter samples being procured from the respective manufacturers. So far from carbon being the chief impurity, Profs. Eliot and Storer have found, by a qualitative examination of the residues left by these zincs when treated with dilute acids, that the impurities consist chiefly of metallic lead, and that carbon, tin, copper, arsenic, and other impurities found in it by previous observers occur either in very minute quantities or rarely, and, doubtless, accidentally. The subjoined table shows, in as condensed a form as possible, the results which have been obtained:—

| | Quality of zinc. | Weight of zinc taken. | Weight of sulphate of lead. | Corres. weight of lead. | Percent. of lead. | Weight of precipitate | Percent. of precipitate |
|---|---|---|---|---|---|---|---|
| | | Grammes. | Grammes. | Grammes. | | Grammes. | |
| 1 | Silesian | 23·8066 | 0·5082 | 0·3472 | 1·46 | 0·013 | 0·05 |
| 2 | Vieille Montagne | 25·2795 | 0·108 | 0·0738 | 0·292 | 0·0071 | 0·02 |
| 3 | New Jersey | 28·672 | 0·033 | 0·0225 | 0·079 | 0·1285 | 0·44 |
| 4 | Pennsylvania | 26·522 | no residue. | — | — | — | — |
| 5 | Mint | 24·5308 | 0·1768 | 0·1212 | 0·494 | 0·0024 | 0·01 |
| 6 | Rousseau frères | 24·3432 | 0·0379 | 0·0259 | 0·106 | 0·0099 | 0·04 |
| 7 | Berlin | 23·074 | 0·4381 | 0·299 | 1·297 | 0·0041 | 0·01 |
| 8 | Minera | 29·999 | 0·5235 | 0·3569 | 1·192 | 0·0021 | 0·01 |
| 9 | Mines Royal | 38·8276 | 0·469 | 0·3197 | 0·823 | 0·0016 | 0·00 |
| 10 | Dillwyn and Co. | 31·6425 | 0·771 | 0·5256 | 1·661 | 0·0011 | 0·00 |
| 11 | Vivian and Sons | 27·724 | 0·6165 | 0·4203 | 1·516 | 0·0079 | 0·02 |

From the elaborate and interesting nature of the paper, we could wish to give the details, *in extenso*, of the mode by which these results were arrived at; but must content ourselves with alluding simply to the more prominent points, and remarking that extreme care appears to have been taken to ensure perfect accuracy. A weighed amount of each zinc was dissolved in dilute sulphuric acid (common sulphuric acid, with four parts of water—the mixture being left some days before decantation), saturated with sulphuretted of lead. When the zinc was dissolved the black residue was separated from the solution by decantation, treated with a few drops of nitric acid and gently evaporated to dryness. The white residue thus obtained was washed with the same dilute acid, into the original solution of the zinc which was filtered after standing 48 hours, and the precipitated sulphate of lead was weighed on a tared filter—the amount of lead was thus quantitatively determined. To remove all doubt as to the saturating of the acid with sulphate of lead, experiments were made which gave results proving that none of the minute quantity of lead in the sulphuric acid was weighed as sulphate at the close of the analysis. It was likewise found that the insolubility of the sulphate of lead was not diminished by the presence of a large amount of sulphate of zinc.

The filtrates from the precipitates of sulphate of lead (column 3) were saturated with sulphuretted hydrogen for 24 hours or upwards, and the small precipitates which separated were filtered off, washed quickly with sulphuretted hydrogen water, dried, and ignited; they were then treated with a few drops of nitric acid, again evaporated to dryness, ignited, and weighed. The colour of these precipitates was yellowish brown, with the single exception of the precipitate obtained from New Jersey zinc, which was blackish. When this blackish precipitate from this zinc was moistened with nitric acid the blue-green colour of the partial solution suggested the presence of copper, and a separate determination of the amount of copper in this zinc was, therefore, made, and will be given hereafter. The colour of the precipitates from the other zincs excluded all the metals of the group precipitated by sulphuretted hydrogen, except arsenic, antimony, tin, and cadmium. The first two of these metals do not exist in zinc, as we shall hereafter show, except in exceedingly minute quantities, and of any such minute quantities would probably have been driven off by ignition, twice repeated, of the precipitates. The small precipitates weighed must, therefore, have consisted of the oxides of tin and cadmium. The results of these analyses are given in columns 6 and 7 of the above table. If it be remembered that the weights given in column 6 are not those of the metals themselves, but of their oxides, it will be apparent that tin and cadmium together form but a very insignificant impurity in commercial zinc. In none of the ten samples analysed, except the New Jersey zinc, can the sum of the tin and cadmium amount to 1-25th of 1 per cent. The precipitates whose weights are given in column 6 (except New Jersey, which alone gave indications of copper) having been moistened with nitric acid, were digested with distilled water, and then filtered. Through the filtrates sulphuretted hydrogen was passed, producing in each case a yellow cloudiness, which was too small in amount to be further examined. That portion of each precipitate which was insoluble in water, and, therefore, remained on the filter, was examined before the blow-pipe by incinerating the filter and precipitate on charcoal, and fusing them with pure oxalate of potassa in the reducing flame. The fused mass was groundin an agate mortar, and the solution tested with sesquichloride of gold. The results of the blow-pipe test for tin, with the several samples, were with No. 1, no tin, or but very uncertain traces; No. 2, distinct spangles, probably tin; No. 3, abundant spangles of tin, which gave the reaction with sesquichloride of gold; No. 5, no tin; No. 6, faint traces of tin; No. 7, distinct spangles, probably tin; No. 8, no tin; No. 9, a very uncertain trace of tin; No. 10, faint traces of tin; No. 11, distinct spangles of tin, which gave the reaction with sesquichloride of gold.

No spelter except that from New Jersey gave the slightest evidence of the presence of copper; this contained 0·0233 grammes of copper in 1·8 grammes of zinc experimented upon, or 0·1298 per cent. of copper—in what way the copper was introduced into this zinc they do not undertake to explain. Iron is usually to be found in commercial zinc, and enough quantitative determinations of the amount of this impurity have been already published to show that it very rarely exceeds in amount 2-10ths of 1 per cent.; and that, moreover, it is an impurity introduced into the zinc from the iron moulds in which the spelter is generally cast. In commercial zinc Profs. Eliot and Storer have found the iron to vary from 0·0549 to 0·2988 per cent.; and Karsten has already proved that *werkzink* (zinc which is the immediate product of distillation), which contained only 0·03, 0·04, and 0·05 per cent., gave, after casting into cakes, 0·154, 0·180, and 0·210 respectively. With reference to carbon as an impurity of zinc, Profs. Eliot and Storer conclude that the oft-repeated statement, that the insoluble residue from zinc treated with dilute acids, rests on no adequate foundations, and that carbon is not an invariable constituent of crude zinc, which is of iron; but, on the other hand, it is impossible to assert that carbon does not sometimes occur in commercial zinc as an accidental and not abnormal impurity. The presence of sulphur in the insoluble residue of zinc is, without doubt, very rare; but it is, also, an unquestionable fact that a certain amount of sulphuretted hydrogen gas is generated whenever commercial zinc is treated with dilute acids. The general opinion that arsenic is a very common impurity in commercial zinc may, as Professors Eliot and Storer think, be traced back to the confident assertion of Proust, now beginning of this century, afterwards extensively copied and generally believed; but it is quite clear that Proust, and, probably, many others of the early chemists, were led into error by the close external resemblance of sulphide of arsenic to the sulphide of cadmium; which last metal, not recognised until 1817, has since been shown to be a very common admixture of the zinc of commerce. Professors Eliot and Storer, after a long series of experiments, conclude that much of the zinc of commerce is free from arsenic, or, at least, contains no arsenic that can be detected by the most delicate tests known for that metal—Marsh's test being inapplicable owing to the liability of the acids to contain arsenic.

With respect to the ores from which the zincs are generally ma

...red, Profs. Eliot and Storer remark that the Silesian zinc is usually from ...rbonate and silicate of zinc; the Belgian from carbonate and silicate ...ntaining a little lead; the English from blende; the New Jersey from ...e red oxide of zinc mixed with Franklinite, and from the published ...alyses of these minerals, the natural inference would be that they should ...ld a zinc of excellent quality; and the Pennsylvanian from a hydrated ...licate (electric calamine)—this zinc was found to be the purest analysed.

## WICKLOW COPPER MINE COMPANY.

An extraordinary general meeting of shareholders was held at the com...ny's office, Dame-street, Dublin, on Tuesday, for the purpose of consi...ring the following special resolution:—"That the joint-stock company ...own by the name of the Wicklow Copper Mine Company (Limited) be, ...d is hereby declared, dissolved, and that the affairs thereof be wound-up ...ntarily, pursuant to the provisions of the Joint-Stock Companies' Acts, 1856-57."

The chair was occupied by Mr. JOHN BARTON, the Chairman of the company.

The SECRETARY (Mr. Henry A. Cruise) read the advertisement convening the meeting, ...d the following circular:—

"It is with pleasure the directors of the Wicklow Copper Mine Company (Limited) are ...e enabled to communicate to their proprietors the result of the recent negociations ...h the Hibernian Mine Company. It may not, perhaps, be generally known to the ...prietors that this company holds only a terminable lease, at a royalty of one-tenth, of ...e Ballymurtagh Mine, which it has so long and so successfully worked, the Hibernian ...e Company being the landlord in fee. The Hibernian Mine Company is incorporated ...er the 32d Geo. III., cap. 24, and has power to augment its capital, as may seem ex...ent, by issue of 100*l.* shares. At present the Hibernian Mine Company has only issued ...0 shares, while the Wicklow Copper Mine Company has issued 5000 shares. To amal...ate these two companies on fair and equitable terms has long been the anxious wish ...our directors, for the obvious purpose of securing to their proprietors a perpetuity of ...r interest in the undertaking, and they have now the prospect of obtaining this im...ant object without any pecuniary sacrifice on the part of this company. The directors ...the Hibernian Mine Company are also equally impressed with the desirability of ...ing the two companies, whose interests are so intimately connected, and have decided ...ecommending the proposed arrangement for adoption by their proprietors. The basis ...the amalgamation agreed on by the two boards is that the Hibernian Mine Company ...ld purchase up the Wicklow Copper Mine shares, on terms to be determined by the ...ive profits of each company, the result of which is that the Hibernian Mine Com...y gives three of its shares for every two of the Wicklow Copper Mine Company. It ...be found by an examination of the profits of the two companies, taken from the last ...ve half-yearly accounts, already in the hands of the proprietors, that no nearer ap...imation to an exact result would have been practicable, while the fractional advan...e is in favour of this company. On this union being completed, all doubt, trouble, ...expense in seeking to obtain renewals of your present lease will be avoided; and each ...holder thereupon will, by virtue of the before-mentioned statute, be entitled, in fee, ...his interest in the company. The method of carrying out the amalgamation, as ad...d by counsel, requires the formal dissolution of the Wicklow Copper Mine Company, ...the vesting of its property in a liquidator or liquidators, who will be empowered, by ...solution, to sell the same to the Hibernian Mine Company for 7500 shares of that ...any, to be distributed among the shareholders of the Wicklow Copper Mine Com...y in the proportion before mentioned. This resolution must be confirmed at a second ...al general meeting, when the Wicklow Copper Mine Company will be completely ...orated with the Hibernian Mine Company. This proceeding will be only formal; ...anagement and the business of the Wicklow Company will remain as it has been, ...ly difference being that, in compliance with the Act of Parliament, the name of ...mpany will be the Hibernian Mine Company, in place of the Wicklow Copper ...e Company (Limited). Your directors have only further to add that the perfect ...ity of the proposed plan of amalgamation has been certified to them by the opinions ...minent counsel, both of the English and Irish bars, upon joint cases submitted to ...respectively on behalf of the directors of the Hibernian Mine Company and the ...klow Copper Mine Company (Limited)."

The CHAIRMAN said that before the business of the meeting commenced he had to ...ise to the shareholders for the very inadequate accomodation which the offices ...ed them. The subject which was that day to be brought under their notice had ...ed for a long time the anxious consideration of the directors. The result was, that ...recommended to the meeting for adoption the circular which had been read. The ...ce which the company has to make was, after all, only the sacrifice of a name ...had been associated with feelings of success, and pleasant recollections of the past. ...believe that by the contemplated amalgamation they would derive large, real, and ...ntial benefits. They had determined on giving their property on surface and in ..., in perpetuity and in fee, to the Hibernian Mine Company. By doing so they ...ted any doubt by possibility existing when the time arrived for the renewal of the ...of this company to be considered. This was an important consideration. In the ...r the directors did not think it right to enter into anything like details, but he ...t it would be as well to mention, as many gentlemen were aware, that the Hiber... Mine Company had privileges and advantages connected with the harbour at ...w. As the conservators of the harbour, they had privileges connected with the ...ge and tolls. It might be apprehended by those not acquainted with the circum...that the advantages connected with the harbour would not be compensated for ...expenses incurred. The directors had exhibited to them the accounts of the last ...lf-years of the Hibernian Company, so far as they represented the receipts from ...s and wharfage, and they found that they were as near as possible to the nett ...they expended for the same period. Therefore, there was nothing to be appre...d from being united with the company at that part of their interest. The compa...calculations, and the views that the board had of the question of union, had been ...lly and clearly represented to the shareholders. They had received from the first ...ties at the English and Irish Bars declarations that this was not only a legal ...ing, but that it was entirely independent of any additional responsibility or lia...y that already existing in the Wicklow Copper Mine Company. (Hear, hear.) ...inions appear to be so clear and decided that the directors had no hesitation in ...their expression in favour of the proposed amalgamation. The directors would ...e come forward with this clearly expressed declaration if they were not perfectly ...d that the proposed change was for the benefit of the shareholders. He would be ...o answer any questions put to him. It was necessary to appoint two liquidators, ...r that after the next meeting they might carry out the details. They had the ...tion of selecting two gentlemen for that purpose—Mr. Nathaniel Hone and Mr. ...el Caldwell. In conclusion he begged to move the resolution for the consideration ...h the meeting had been called.—Mr. QUINAN seconded the resolution.

JOHN SMITH said he had some questions to ask the directors. He was of opinion ...e shareholders had not rightly understood their position, or how they were re...ed at the board. It was all-important for them to know that, when the question ...d was the annihilation of the Wicklow Mine Company. They had five direc... the board of this company, and the first question he would ask was, how many ...belonged to the Hibernian Mine Company?—The CHAIRMAN: Three, I believe.

MITH resumed: They had a majority of the board directors of the Hibernian ...y. The majority of the trustees were interested for their landlords, the Hiber...pany. Although he was a small shareholder, he believed he was expressing ...s of a great many gentlemen who were shareholders to a large amount in the ...y. It was the bounden duty of the directors in their circular, when recommend...amalgamation, to have stated facts and figures. At present the company was ...le for the amount of its shareholders, but it was proposed to swallow it up in ...ernian Company. Although they had not a lease in perpetuity, they had a ... an unexpired term of 22 years, the longest term usually given to mining com... He was of opinion, that instead of winding-up this prosperous company under ...f Parliament, intended only to apply to insolvent companies, they should take ...e constantly taken in amalgamations by prosperous companies in England, of ...e an Act of Parliament for the purpose. The advantages to be derived from an ...ation with the Hibernian Company was not so manifest, as the increase of that ...was derived from the increase paid to them by this company. After some ...emarks, Mr Smith concluded by moving, as an amendment, that it was not ex...at present to dissolve under the Winding-up Act this properous company.

ANTHONY FOX did not see any reason for proposing the amendment. It was idle ...about the company being insolvent, or about their being swallowed up. Who ...ng to swallow them up but themselves? The question whether the company ...ain its own name or adopt that of the Hibernian Company was immaterial. ...RN begged to explain that he did not say the company was insolvent, but that ...under which it was proposed to wind it up referred to insolvent companies. ...X, resuming, said that it was for the benefit of the company to amalgamate. ...e statement that three of the directors belonged to the Hibernian Company, he ...y that he understood that the board had unanimously recommended the adop...e resolution.—The CHAIRMAN: You are quite correct in that.

...X said that if there was any increased liability in consequence of joining the ...pany it was too slight to be mentioned.—The CHAIRMAN: There is none Sir.

... HONE, jun., said that the circular was not explanatory enough. He would like ...with the board, but he wanted some more information before doing so. He would ...to Mr. Smith the propriety of withdrawing his amendment; but, at the same ...thought that the directors should give the shareholders outside an opportunity ...ering the matter. He did not want to oppose the directors; but he did not ...be bound down by a resolution that might be very injurious to the company. ...some discussion, Mr. Smith withdrew the amendment.

... proposed an amendment, declaring that inasmuch as the directors had pro...amalgamate, without having furnished satisfactory statements to the share...that a committee of shareholders be formed, and be empowered to meet, from ...me, to investigate and to report to the general body of the shareholders, and ...directors be requested to furnish all the information in their power.

... O'BRIEN seconded the amendment. He stated that he had tried to get shares ...ernian Company, but could not. He wanted to know the price paid for those ...—Mr. M'DOWELL (director) said he had paid 31*l.* 5*s.* for each of them.—Mr. E. ...RIEN: The next question is the amount of dividend paid on them?—Mr. ...L: About 7*l.* 10*s.* In answer to another question of Mr. O'Brien, he stated ...amount of royalty reserved to the Hibernian Company, with respect to new ...e one-sixteenth, and not one-tenth, the amount previously reserved. That, ...was on the part not as yet worked. On the worked part they paid one-tenth. ...RIEN entered at length into the details connected with the contemplated change. ...pany were wound-up, the Act under which that was done should be incorpo... in the Act of 32 George III., which was a very ancient Act, and which would ...ficult to carry out in its details. He went through several of the clauses for ...se of showing the inconvenience that would result if the company existed under ...ets incorporated. As the board could not represent two conflicting interests, ...e bound in honour, and having regard to the high position they occupied, to ...aid of the shareholders. In conclusion, he begged to state that in the remarks ...e he did not intend to say a word derogatory to the high position or personal ... of the gentlemen who formed the board of management.

...AIRMAN remarked that they should be obliged to Mr. O'Brien for the lucid ... which he had brought before them a number of important questions, and stated ...ould leave the task of answering a number of the objections raised by Mr. ... a gentleman most experienced on the subject—Mr. Wright.

...RIEN remarked that the name appended at the end of the case submitted to ...se that of the secretary to the company. He thought that a case on such an ... matter should have been prepared by their solicitor.

...RE said he had gone there prepared to support the board, but his opinion had ...ed by the able arguments of the gentlemen who had spoken on the other side. ...prised to learn that the majority of the board was composed of the gentlemen ...m they would have to deal as the representatives of the Hibernian Company. ...arr contended that the directors had not been fairly dealt with. They had ... object in the matter at all. It appeared they all agreed that the object was one which was desirable to be carried out, only they differed as to the means of carrying it out. The directors did not want to control or coerce the meeting, but having candidly stated their views, they left the decision of the question with the shareholders.

Mr. M'DOWELL, director, considered the amendment most extraordinary, and said he would not be a director of any company that was bound in such a way, as he considered it cast a reflection on the board.

Mr. O'BRIEN denied that any such idea was contemplated.

Mr. FOX thought that a good deal of time was wasted unnecessarily.

Mr. NATHANIEL HONE said that the amendment appeared tantamount to a reflection on the board.

Mr. WRIGHT suggested that for the purpose of arriving at a settlement of the question they should adjourn for three weeks, and in the meantime receive suggestions, explain doubtful matters, and give information.

After a lengthened discussion, Mr. JOSEPH HONE, jun., moved that Mr. Octavius O'Brien, Mr. Robert O'Brien, Mr. Joseph Hone, jun., and Mr. John Smith, be appointed and empowered to make such investigations in conjunction with the board as they might deem necessary, and report thereon, in reference to the subject-matter of the meeting.

Mr. WRIGHT protested against the amendment, which, however courteously worded, conveyed a reflection on the board.—Mr. M'DOWELL concurred.

The amendment was put and carried, and on the motion of Mr. JOSEPH HONE, jun., it was resolved that the meeting should stand adjourned to that day three weeks.

The business having concluded, a vote of thanks was accorded to the Chairman, on the motion of Mr. RICHARD O'BRIEN, and the meeting separated.

## GLAN-Y-PWLL SLATE AND SLAB COMPANY.

The first annual meeting of shareholders was held at the offices of the company, on Monday, Mr. G. B. CARR in the chair.

The reports stated that the directors "feel great satisfaction in being able to assure the shareholders that having, as soon as they took possession of the property, consulted the best practical men in the district, they, under their advice, have further tested the property by driving a tunnel across the vein so clearly described in the reports. The manager has opened a second tunnel within 20 yards of the top of the mountain, which will shortly communicate with the works at surface, whence many thousand cubic yards of debris have been removed to open the way to the point where operations will shortly be commenced for the development of the quarry by opening east and west upon the vein. These operations have fully satisfied your directors that the reports in the prospectus are fully borne out, and that every practical opinion they could obtain is a fresh assurance that you have a valuable vein of slate, that requires only time to become largely profitable; and as the facilities for working the quarry are great, and the terms upon which it is held unusually favourable, there is every reasonable ground to expect that before the expiry of another year the results will be highly satisfactory to the proprietors. Your directors, as a precautionary measure, before incurring heavy expenses that might be valueless, ascertained by a variety of tests the character and quality of the slate, the width and extent of the vein, the advantages they possess for working the quarry, and every other point that had a bearing upon the good management and success of the undertaking; with this object in view two of your directors visited the quarry last November, and obtained the opinions of several practical quarrymen (Messrs. Williams, Roberts, Edwards, and Owen) as to the propriety and expediency of commencing preparatory measures for opening the quarry from the top of the mountain by galleries, so as to work down east and west upon the vein. This plan they approved of, and further recommended the directors without delay to commence the incline, which would, when completed, very much facilitate the work; likewise that the machinery for sawing, planing, &c., should be set up with as little delay as possible. Acting upon those recommendations your directors have accepted contracts for their completion at the quarry by June 1 next. Your directors have the satisfaction to inform you that about three months since they engaged the services of a local agent, Mr. John Edwards, a thoroughly practical quarryman, fully conversant with every department of his business, and highly recommended, as a well qualified manager. They now submit to you statements of accounts for the year The preliminary expenses are moderate, and economy has been strictly observed in every department. In conclusion, your directors have every confidence in the soundness of the undertaking, and that time will develope it to the satisfaction of every shareholder. The extraordinary demand for slates, and the high prices obtained, must insure large profits as soon as returns can be made. In conformity with the Act, at the first ordinary general meeting, after the incorporation of the company, the whole of the directors retire from office, but they offer themselves for re-election."

The statement of accounts, from the commencement of the company to Jan 31, showed:

| | | | |
|---|---|---|---|
| Balance of purchase-money of the quarry | £2,600 0 0 | | |
| Cost-sheet for January | 109 11 6 | = £2,709 11 | 6 |
| To capital—6000 shares at £5 each | 30,000 0 0 | | |
| Amount paid up—1000 shares at £3 | 3,000 0 0 | | |
| 4055 shares at £2 | £8,110 0 0 | | |
| Less—Arrears of first call | 600 0 0 | = 7,510 0 0 = 10,510 0 | 0 |
| Total | | £13,219 11 | 6 |
| By cash at bankers | £1,363 19 6 | | |
| „ in hand | 22 6 8 | = £1,386 6 | 2 |
| By property held by the company—Lease of quarry and property therein | | 10,000 0 | 0 |
| By preliminary expenses | | 624 9 | 0 |
| By sundry expenditure—Labour and outlay at quarry, 824*l.* 0*s.* 5*d.*; plans, reports, &c., 22*l.* 5*s.*; office rent, stationery, postages, &c., 82*l.* 16*s.* 2*d.*; travelling expenses, 79*l.* 12*s.* 3*d.*; salaries of manager, clerks, &c., 141*l.* 6*s.* 6*d.*; directors' fees, 58*l.* 16*s.* | | = 1,208 16 | 4 |
| Total | | £13,219 11 | 6 |

The CHAIRMAN expressed his satisfaction at meeting the proprietors on this occasion, and to be able to assure them that so far as they had prosecuted the undertaking they had every reason so be satisfied with the results, which confirmed all the anticipations held out in the prospectus, and which honourable proprietors may have been able to learn from the statement in the reports sent to the shareholders with the notice of this meeting. Slate quarries, it is well known, in most instances take a long time to develope, but there are features in this undertaking which lead the directors to believe, from the favourable positions possessed by the company for working a quarry, that profitable results may be anticipated much earlier than is usually experienced. Taking into consideration the great demand for slate, and the large profits realised by most of the quarries, there is every encouragement for us to persevere with as much energy as possible; and the directors hope by the time we meet again they shall have a very satisfactory report to give to the shareholders. He now begged to move that the reports and accounts be received and adopted.—Seconded by Mr. A. E. STACEY, and carried unanimously.

Mr. JAMES WRIGHT moved the next resolution—That the following gentlemen be re-elected directors of the company—Mr. G. B. Carr, Lieut.-Col. Ottley, Col. Bush, and Messrs. Wm. Ogilvie, Jos. Jacklin, and Morris Roberts; he did so with great pleasure, because he had recently visited the quarry, and having obtained a degree of knowledge in these matters he must be permitted to express his surprise at so large an amount of work done at so small a cost. Your directors must have well guarded your interest by economy, and have pressed on the works with vigilance, and they are fully entitled to your confidence and support. I have no doubt of the success of the undertaking in their hands, as you have a continuation of the same vein as is worked upon so profitably by the neighbouring quarries in the district.—The resolution was seconded by Mr. R. MIGHELL, and carried unanimously.

Mr. A. E. STACEY, seconded by the Rev. H. HALL, moved a vote of thanks to the directors for their services during the past year.—Carried unanimously.

Mr. JAMES WRIGHT, seconded by Mr. JOSEPH CROFTS, moved a vote of thanks to the Chairman.—Carried unanimously.

The meeting was represented by proprietors holding 1863 shares; and proxies, 1897.

## GREAT WHEAL MARTHA MINING COMPANY.

The third annual general meeting of shareholders was held at the Radley's Hotel, Bridge-street, Blackfriars, on February 22,

Mr. JAMES WRIGHT (managing director) in the chair.

The advertisement convening the meeting having been read, the report of the directors and balance-sheet (an abstract of which has already appeared in the Journal) were taken as read.

The report of Capt. James Seccombe recommended the continued prosecution of certain points of operation, and concluded by stating that if his recommendations were carried out it was his opinion they would be attended with success, and that the proprietors would be well rewarded for a further outlay of capital. After a careful calculation he had arrived at the conclusion that, in addition to the profit that could be made on the returns, a further sum of 2000*l.* would be required, and he had every reason to believe that the legitimate expenditure thereof would prove the points enumerated.

The CHAIRMAN said it had been observed the general burden of the directors' report consisted of a review of the transactions of the company during the past year. Several questions had been put to him with reference of the early history of the mine prior to the time when it became the property of the present company, which had caused him to make some enquiries into the matter. The present company, he found, was talked about being formed in 1857, but was not registered till 1858, when the purchase of the property was effected for 5000*l.*, the company's capital being 10,000*l.* During the ensuing half-year the company sustained a sort of semi-existence, being without any funds—indeed, the result of his examination induced the belief that from the commencement the undertaking had been affected with a sort of chronic disease—a want of funds. In 1859 a new board of directors was appointed, and after various suggestions it was agreed to purchase a first-class engine, which, with the appurtenances, incurred an expenditure of something like 1100*l.* Some six or eight months were occupied in getting the engine erected, and when it was got ready for working a further expenditure of about 800*l.* became necessary in providing the requisite pumping gear and attachments. During the first year, what with paying 5000*l.* for the mine, and paying preliminary expenses, advertising, and the cost of keeping three or four men upon the mine to prevent the revocation of the lease, the company's capital had, of course, been very considerably reduced; and during the next year, what with the erection of the engine, pumping gear, and the necessary buildings, nearly 2500*l.* was further expended. In August, 1860, the engine, with all its attachments, was completed, and set to work, and in that month was forking the water; but at that time it appeared the board found they did not possess more than 500*l.* of actual capital. However, the water was forked, and, fortunately, a considerable quantity of ore was obtained, which realised a very good price—indeed, during the next few months, the ore returned more than paid the actual outlay upon the mine. At the meeting of shareholders in December, 1860, it was thought, from the then returns of ore, that the company could go on without any further capital: but, notwithstanding, other shareholders, and he himself, doubted this, and the meeting separated without increasing the capital. Within a month of that period the Duchy refused to let them sell the ore without first having it crushed, upon which the directors feeling they had no alternative, came to a resolution to procure a crusher. Another meeting was called, when it was stated that 2500*l.* would clear the company of all liabilities; but in that amount there was not included a floating debt. Therefore, although at that meeting it was agreed to raise 2500*l.*, there was, in reality, about 1000*l.* unprovided for. Out of the 2500*l.* had to be deducted for discount and unpaid calls about 700*l.*, which left but 1800*l.* to start with in the re-development of the mine, pay for the crusher, and pay off the floating debt. It had been calculated that the crusher and appurtenances would cost about 1000*l.* or 1200*l.*, but it had cost nearly 2000*l.* About four months after that meeting adeputation of the directors, accompanied by a first-class mining captain, visited the mine, when a new state of things was inaugurated. Upon investigation they found that during the ensuing five or six months a certain quantity of ore could be produced, which would leave a margin of profit, but it was found that to continue the development of the mine with advantage further capital must be provided. But then the question came, supposing additional capital was raised, what chances did the mine present that a successful career would be secured? Their captain, who was present, states that there were now in the mine between 800 and 1000 fms. of ground partially opened, all of which would give a certain quantity of ore. Taking a low calculation, it was thought probable the whole of that ore would realised an average of 4*l.* per fm., so that there would be realised, taking an almost minium valuation, an aggregage sum of 4000*l.*, out of which they might safely calculate to realise 2500*l.* nett profit. But notwithstanding that, to permanently develope the mine with success the directors must be provided with a larger amount of floating capital. During the past four or five months the directors had made themselves personally responsible for something like 4000*l.*, which was owing to the fact that the amount realised by the ore was not forthcoming until some time subsequently to its sale, and, therefore, the directors had been compelled to make advances to pay the men, and to meet other current expenses. For his own part, he had given considerable attention to the company, he had personally, inspected the property, and he had no doubt that Great Wheal Martha would prove a first-class mine. He knew some thought that a great deal of money had already been spent upon its development, but that such was not the case was evidenced by the accounts, which showed that there had been only about 1060*l.* expended upon the actual development of the mine, while 5000*l.* worth of ore had been raised. He had no hesitation in saying if a proper capital were provided, and a proper development pursued, that Great Wheal Martha would become a permanently productive property; but that until a depth of 60 fms. was reached they must not expect to have first-class ore, except in bunches. He concluded by moving the adoption of the report and accounts.

Mr. G. BATTERS enquired what was the mode by which the directors proposed to raise further capital?—The CHAIRMAN replied that the board would much prefer the mode of raising further capital to be initiated by the proprietors.

Mr. BATTERS: What do you calculate a sufficient sum?—The CHAIRMAN: We have at the present time no capital. We have simply the machinery and plant as an asset to put against our debt. We have, however, sufficient ore to pay all our debts.

Mr. BATTERS: I think, Sir, our total working expenses at the present time are between 600*l.* and 700*l.*—The CHAIRMAN: Yes, but we cannot continue it without further capital. We want a floating capital to conduct our business, and we want further capital to assist in the development of the mine.

Mr. BATTERS: It appears to me that up to the present time the capital of the company has been expended upon the surface.—The CHAIRMAN: With the exception of 1200*l.* The report upon the mine, just read, shows that the present end in the 20 was worth 15*l.* to 20*l.* per fm.

Mr. BATTERS: I have been asking the captain if he considers that a new shoot of ore, and how far that end was in advance of the ends in the 30, 40, and 50?—The CHAIRMAN: The captain, I think, considers it a continuation of the same run of ore.

Capt. RICKARD: There is a new shoot of ore in the back of the 10, but that was 100 fms. from Thomas's shaft west.

Mr. BATTERS: Has that been seen in the 20, 30, or 40 east?—The CHAIRMAN: No, because those levels have not yet been driven far enough; but according to the underlie of the lode we must reach it soon. All these points would have been further developed had there been capital to pay for it. I have no hesitation in saying that had there been capital enough the mine by the present time would have been in a favourable position.

Mr. BATTERS: I think, Capt. Rickard, that in the neighbouring mine the 160 and 170 are the best levels.—Capt. RICKARD: The best level is the 160.

Mr. BATTERS: It is impossible to work the mine without capital, nor can we expect to have a good mine without shafts and driving levels. In this mine we have great encouragements, if indeed not a certainty, that by sinking shafts and driving levels a large quantity of ore will be raised.

The CHAIRMAN, in answer to further questions, said that there would not be the slightest difficulty in placing any number of additional shares proprietors might think fit to issue. He failed to see any cause for the shares being sold at 17*s.* 6*d.*, for he believed they were intrinsically worth a great deal more. It had crept out that the company's funds had been exhausted, but when it became known that funds had been provided for the development of the mine the market value of the shares would rise to 25*s.* or 30*s.*, which they were intrinsically worth.

Major SUART said that 17*s.* 6*d.* was but a nominal quotation, for he was receiving 6*d.* per share for 100 shares not delivered.

The report and accounts were then received and adopted.

The CHAIRMAN said the next question was with regard to raising additional capital.

A PROPRIETOR suggested the propriety of raising the necessary money by mortgaging the mine.

Mr. SEAREY said that matter had been discussed by the board some time ago, but it was found to be impracticable. The company's credit, owing to all shares now being paid up, was, at least so far as borrowing money was concerned, very limited.

The CHAIRMAN, in answer to a question, stated that Capt. James Seccombe had estimated the mine could be brought into a profitable position by a further outlay of 2500*l.* But the directors, to meet all contingencies, would suggest that 3500*l.* should be raised.

After some discussion, the retiring directors being re-elected, a resolution was unanimously passed that 3500 shares of 1*l.* each be created, payable in calls of 5*s.*, and to be issued, in the first place, rateably among the existing shareholders.

A vote of thanks to the Chairman and directors terminated the proceedings.

## PENDEEN CONSOLIDATED MINING COMPANY.

The ordinary general meeting of shareholders was held at the London Tavern, on Tuesday, Mr. W. BAWDEN in the chair.

Mr. D. COHEN (the secretary) read the notice convening the meeting, and the minutes of the last were read and confirmed.

The accounts for the two months ending December showed a loss of 561*l.* 18*s.* 8*d.*; and the general balance-sheet showed an excess of assets over liabilities of 520*l.* 6*s.* 3*d.*

The report of the agents stated that the lode in the 118 and the 130 had not turned out as had been expected. A good lode was left going down in the bottom of the 108, 25 fms. in length, also in bottom of the 118, 15 fms., and by reason of their dipping north much faster than expected they had not been reached; but they believed the runs of ore were continuing in depth, and that they had cut them, and shortly should be in a better position.

An extract of a letter from Mr. White, the purser, was read, to the effect that he believed Pendeen had seen the worst of its days, and that after opening a fair quantity of ore ground in the 118 they would certainly do much better in future.

The CHAIRMAN said that although he had to ask for a little further patience on the part of the shareholders, he still confidently believed that in Pendeen they had a really good mine. They were now driving the 82 with all speed to cut the great Pendeen lode. The underlie of the lodes were coming towards the end in the 82, and the 82 was underlying towards the great Pendeen lode, and which, it was expected, would be reached in about 8 or 10 fms. driving. That would take about three months to drive, but it was impossible to speak with certainty, as they could not at present tell the exact underlie of the lodes. The attainment of that point was one of the great objects for which the Pendeen Mine was commenced. There had been a considerable amount of expense, both with regard to the lease and survey, in excess of that calculated by the committee; and the loss of time that had taken place before the lease was completed had to a great extent thrown out their mining operations. Although in the interim they had proceeded with the sinking, yet they had not been able to extend the levesl, and work away the ore ground, or they would not have been in their present position. As it was, however, they had two levels coming into ore—the 118 and the 130, and they had reason to believe that as those levels were proceeded with the ore would improve, and that it would also increase in value in depth. So that theirs was not like a mine that had been worked out, as all their ends were coming into a better quality of ore; notwithstanding, it was a matter of the greatest annoyance to the committee to find themselves in a position to be compelled to make a call, as they would feel it pecuniarily more than, perhaps, any of the shareholders.

Mr. CURLING enquired if the committee had not thought a better result would be realised when the lease was obtained?—The CHAIRMAN replied that the committee had been given to understand that the ore had gone north in the 94 and 106, but up to the present time those two levels had apparently failed; had the ore been found, however, it could not so soon have redeemed the state of the company's finances. The ore might yet be found in those levels. The driving of the 94 had been temporarily suspended, so that if the ore was found in the 106 the upper level might be resumed.

Mr. CURLING suggested that the mine should be inspected by some disinterested and competent authority.—The CHAIRMAN said that any shareholder was at liberty to have the mine inspected at any time.

Mr. BIRDSEY thought the captain's report gave a satisfactory exposition as to the reason the ore had fallen off—the lode having dipped 20 ft. north in a depth of 12 fms.

The CHAIRMAN said the only thing was the ore had dipped more rapidly under the sea than had been calculated upon. He thought two months longer would show a totally different state of things.

Mr. M'CALLAN supported the proposition of Mr. Curling, that the mine should be inspected by some disinterested authority, and suggested Capt. F. Pryor.

The report and accounts having been received and adopted,

Mr. BIRDSEY said it was with some hesitation than he proposed a call of 3*s.* per share, but he believed in so doing he was promoting the best interests of the undertaking. If a call to that amount were made, the committee would be in a position to continue what they had always done—realise a discount of 2½ per cent. upon making the merchants' accounts cash transactions.

Mr. M'CALLAN said the question of call was for the largest shareholders to determine.

Mr. MOCATTA (a member of the committee) said, although a large shareholder, he thought upon looking into the accounts, that the best course would be to make a call of 3*s.*

Mr. WADHAM having seconded the proposition, a call of 3*s.* per share was made. The committee of management were re-elected.

A resolution was then passed, requesting the committee to engage Capt. F. Pryor to inspect the mine previous to the next general meeting of shareholders.

A vote of thanks to the Chairman and committee terminated the proceedings.

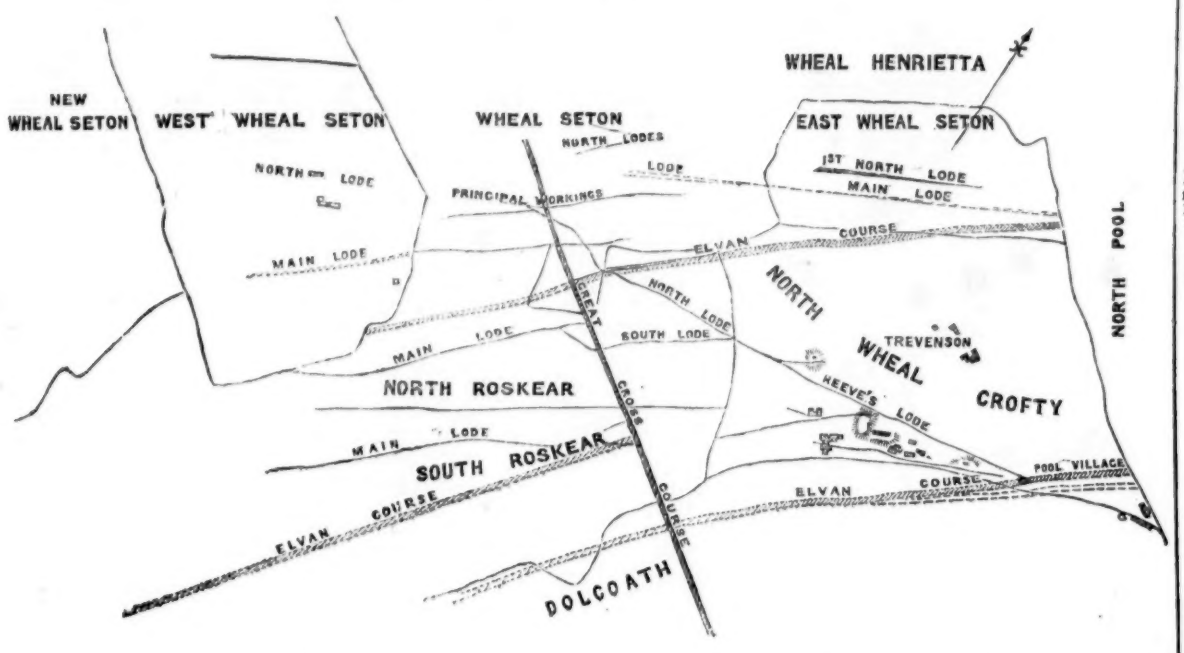
SUCCESSFUL MINING.—As instances of the fortunes which are occasionally made by speculations in mining adventures, we have some particulars in a letter just received from San Francisco:—"There is the famous Alluin Mine, which has been paying $50,000 per month for eight years, and still continues to pay as well as at first. It belonged to three Irishmen and one American, and their united profits from the mine have been about $600,000. The three Irishmen still continue to work the mine: the American, with the true characteristic of the genus, went in for a good time. Latterly, his income got the better of him; he had tried his best to keep up with it, and spend it as he went, but the mine was too much for him, and he 'went under,' literally, a month since—whiskey, women, and $15,000 per month, laid him out. In Washoe there are several paying mines, especially in the district of Gold Hill. I know four parties interested in a mine there, who received all last fall $1000 per day each, as their nett profits. In other parts of California there are a great many paying quartz mines; in Grass Valley and Sonora especially there are mines that have been worked for years at a handsome profit. There is one thing to be said of a good quartz mine—if it is not always very rich, it is generally extensive, and make up in quantity what it lacks in quality, and may be worked to profit for years. The excitement on 'processes' has had its run and died out; of some scores of them, but two or three have stood the test of actual demonstration on a large scale. At the Ophir Mine they worked what is known as the Smith and Deny process, and the old Freyburg, or wasting process, amalgamating in barrels. It is slow, as most German institutions are, and does not come up to the mark yet. Any process of extracting the gold and silver from quartz and sulphurets that would come within 10 per cent. of assay value, at a cost for working of not over $25 per ton on a large scale, would give California an addition of $3,000,000 per month receipts.

WILDS' VENTILATOR.—Mr. Wilds, of Hertford, has just specified, per Mr. Henry, the patent agent, Fleet-street, an improved ventilator, which consists of a box, or case, fitted at the ceiling or roof, and having its bottom composed or wire-work or perforated metal; while at top it is opened and closed by flaps connected to a suspended balance weight by cords or chains passing over pullies. There may be a pair of flaps jointed to a hanging style, or a single flap weighted at one end. The case may be divided by a partition, in the double flap arrangement, to separate the currents of air. There may also be partition plates fixed under the flaps. The ventilator communicates with the outer air through an air trunk or otherwise.

NEW GOLD MINING MACHINERY.—The *Columbian Times* describes some new gold mining machinery, lately put in operation by one Bonnel. The principle on which it works is precisely similar to that of a dredging machine. The dirt is washed down by a hydraulic into a deep pit, from which the iron buckets fastened on to an endless chain, set in motion by a steam-engine, lift both the dirt and water to the sluices, some 30 ft. above. The application of such a machine to mining operations will be found of infinite service where the claims are deep, and it is impossible to cut a deep tail-race.

# PLAN OF THE SETON DISTRICT.

MAP SHOWING THE RELATIVE POSITION OF THE SETON MINES, AND OTHERS ADJOINING.




## THE MINING DISTRICT IN WHICH EAST WHEAL SETON IS SITUATED.

In the great mining district in which the Setons are situated there are three parallel ranges of mines, one at the north foot of the granite hills, which form a part of the great chain traversing the entire length of Cornwall, in an east and west direction, and forming, as it were, its backbone. This includes Dolcoath, Stray Park, Camborne Vean, Cook's Kitchen, Tincroft, and Carn Brea. The next, north, includes the north part of Tincroft, South Crofty, and the Old South Roskear Mine; and the most northerly range comprehends East Pool, North Pool, North Crofty, North Roskear, Wheal Seton, West Wheal Seton, New Wheal Seton, and East Wheal Seton. The earliest of these mines worked and found rich in copper and tin were those at the foot of the granite hills, and then those lying next to them. It was thought, however, by the miners of those days that the ground still further north was beyond the circle in which metals would be found in sufficient abundance to be remunerative, and, therefore, that it would be only wasting capital to give it a trial. A great change has, however, since come over the mind of the mining world in this respect, and it has since been found that conditions which were formerly disregarded have a very important effect in rendering lodes highly productive of metals. One of the most important, and now most generally recognised, of these is the existence of the elvan rock in proximity to a lode, and traversing the stratum in which it is embedded in a nearly parallel line, so as to form a junction with it at varying depths. This has been found a position equally favourable, with immediate proximity to the line of junction of the granite and killas rocks.

The following are some particulars respecting the mines which have been named, and which form one of the richest mining districts in the world:—

Dolcoath is one of the oldest mines of this locality, and was for many years the richest copper mine in England. In its modern working it has given dividends to the amount of 235,385*l.*, but must have yielded altogether profits to the amount of half a million sterling. In depth it became exhausted of copper and productive of tin, of which metal it is now the greatest and richest mine in Cornwall. The richness of the lode in tin has increased with increased depth, the best part of the mine being about 300 fathoms from the surface, beyond which explorations are still being pushed on, the deepest point being about 310 fathoms from the surface. The present returns of tin are of the value of about 66,000*l.* per annum, leaving a profit of about 20,000*l.* per annum, exclusive of some 3000*l.* per annum paid as royalty to the owner of the soil. The market value of the mine is 196,900*l.*

Stray Park and Camborne Vean are the next mines west from Dolcoath, on the same lodes, and have been sometimes worked together, and at other times separately. The amount of profits which they have conjointly given is not exactly known, as they are very old mines, and the records of their earlier workings are not easily, if at all, obtainable; it is supposed, however, to be about 200,000*l.*

Cook's Kitchen is immediately east of Dolcoath, on the same lode, and gave profits from copper to the extent of about 200,000*l.* Like Dolcoath, however, and all the deep mines of the same locality, it ceased to produce copper in depth, and was for a long period unremunerative, until the tin-yielding depth was reached, since which it has resumed paying dividends. Its market value is now 73,500*l.*

Tincroft, the next mine east, has given over 300,000*l.* in profits, a great proportion of which was from copper, but the returns are now principally tin, from which good dividends are being made. The market value of this mine is 54,000*l.*

Carn Brea: These mines are next east from Tincroft, and have made the greater part of their profits from copper, but the principal returns now are tin. On an outlay of 15,000*l.* they have divided profits to the amount of 271,500*l.*, and have a market value of 71,500*l.*

South Roskear Mine, which adjoins Dolcoath on the north, is supposed to have given about 200,000*l.* in profits, but records of the earliest workings, in which the great profits were made, are not obtainable. It did not sustain its productive character in depth, and was abandoned some years since.

The first trial of the mining ground lying to the north of those mines already mentioned, of which East Wheal Seton forms a part, was made in North Roskear, in which, owing to the confidence expressed by Captain Joseph Vivian, the present manager, that good results would be met with, operations have been conducted under his charge with great spirit and vigour, and on an outlay of 7000*l.*, 110,000*l.* have been returned to the shareholders in dividends. This mine is in hard rock, notwithstanding which, so rapidly has it been developed that the engine-shaft has been sunk from the surface to a depth of 267 fms. Altogether about 1900 fms. of shafts have been sunk, and over 20 miles of levels driven, in addition to the large area of the lodes taken away as ore ground. From these facts some idea may be formed of the quantity of copper and tin ore which must have been extracted to defray the cost of operations so extensive; and the immense sum of money realised from which, after giving a profit of 110,000*l.* to the shareholders, has been distributed between the lords of the soil, the labourers, merchants, and shopkeepers of the neighbourhood. The benefit thus conferred on all classes of the community owe their origin to the decided opinion which Capt. Joseph Vivian expressed in the face of adverse opinions, that success would certainly be met with, and to the energy and skill which he has displayed in developing the property.

The prosperity met with in North Roskear led to the working of East Wheal Crofty (now called North Wheal Crofty), which adjoins it on the east, and equally good results soon followed, large courses of copper ore having been discovered very near the surface, and near the junction of the lode and elvan course, from which over 90,000*l.* were divided amongst the fortunate shareholders. This mine was under the management of the late Capt. Nicholas Tredinnick. It is now being worked under the management of Capt. Joseph Vivian, the principal resources being tin, at levels below where the lode ceased to produce copper, and such good discoveries have been lately made in this department that profits are now being made, and dividends may be looked forward to with confidence.

East Wheal Crofty induced the working of East Pool, where, on an outlay of 3104*l.*, dividends to the amount of 39,040*l.* have been declared, and the mine is still making large returns of copper and tin, from which further profits are likely to be derived.

North Pool followed as a consequence of East Pool, and the profits realised were 61,450*l.*, on an outlay of 8180*l.*

The ground now occupied by the Setons remained unnoticed until the great discoveries which were made in North Roskear directed attention to it. One of the richest lodes in the last-named mine was found, after forming immense courses of copper ore both in North Roskear and East Wheal Crofty, to pass in going west into the ground now called Wheal Seton, the value of which was thus pointed out. A sett of it was obtained by Mr. Tilly, the solicitor and steward of Mr. Seton, and great credit is due to him, as the purser of the mine, for the indomitable perseverance with which the explorations were conducted, and for the great success with which they were rewarded. The dividends declared by this mine amount to 52,173*l.*, and large quantities of copper and tin continue to be returned. Fresh discoveries having been recently made, the shares now command a market value for the whole concern of about 45,000*l.*

West Seton was next started, and although at first presenting but little indication of riches, the lode being near the surface of a very unfavourable character, has since turned out the richest of the group. It has already divided 135,200*l.*, and continues to make regular and large dividends, commanding a market value at present of 152,000*l.* The next mines to notice as forming a very important part of the same district, and prominent members of the Seton group, are New Wheal Seton and East Wheal Seton. The former of these is immediately west of and adjoining West Wheal Seton, and the latter immediately east of and adjoining Wheal Seton.

New Wheal Seton will probably be found rich and profitable at deeper levels than have yet been reached, the ore being found deeper as the lodes go west, corresponding with the dip of the junction of the lode with the elvan, as was pointed out in last week's Journal. The operations are being vigorously developed in depth, and the property already has a market value of about 26,000*l.*

East Wheal Seton possesses all the advantages and most favourable features of the most productive of the mines which have been referred to, and it seems destined to occupy the same position in the future history of the rich district in which it is situated as those which have already given so much wealth have done in the past. It will be seen that the extension of the mining field under consideration has been gradual, one mine following naturally as the result of another. All the features of East Seton are of a favourable character: its position, the lodes by which it is traversed, and the additional advantage, which the other Setons do not possess, of the lode coming into contact with the elvan very close to the surface, thus affording the best possible chance of great discoveries of copper being made by a small outlay, and without the tedious lapse of time which so often tires out those who enter on mining enterprise.

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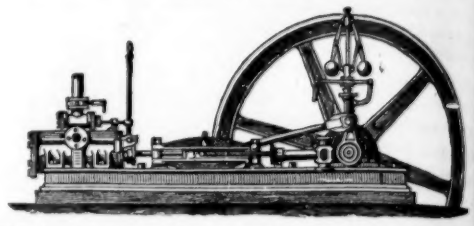

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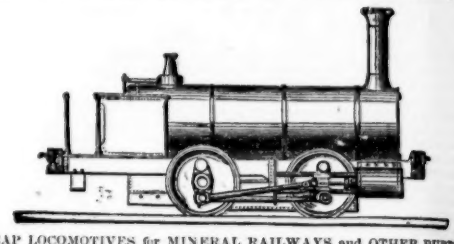

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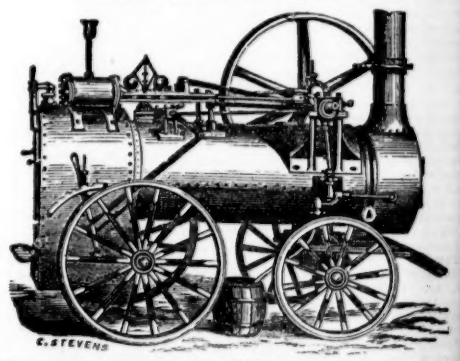


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